PB90-255431

Pesticide Fact Sheet Number 216: Nicosulfuron

(U.S.) Environmental Protection Agency, Washington, DC

29 Jun 90

U.S. Department of Commerce
National Technical Information Service
NTIS

50272-101

REPORT DOCUMENTATION PAGE | 1. REPORT NO. | 2. | 3. PB90-255431

4. Title and Subtitle
EPA Pesticide Fact Sheets - Nicosulfuron No. 216

5. Report Date
June 29, 1990

6.

7. Author(s)
EPA, Office of Pesticide Programs, Registration Division

8. Performing Organization Rept. No.
540/FS-90-096

9. Performing Organization Name and Address
U.S. Environmental Protection Agency
Office of Pesticide Programs
Registration Division (H7505C)
401 M Street, SW
Washington, D.C. 20460

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address
Same as #9

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred:

(1) Issuance or reissuance of a registration standard;
(2) Issuance of each special review document;
(3) Registration of a significantly changed use pattern;
(4) Registration of a new chemical; or
(5) An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement:
Publicly Available

19. Security Class (This Report)
Unclassified

20. Security Class (This Page)
Unclassified

21. No. of Pages
10

22. Price

(See ANSI-Z39.18)

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL
INFORMATION SERVICE
SPRINGFIELD, VA 22161

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

United States Environmental Protection Agency

Office of Pesticides and Toxic Substances (H7501C)

PB90-255431

540-FS-90-096

EPA

Pesticide Fact Sheet

Name of Chemical: **Nicosulfuron**
Reason for Issuance: **New Chemical**
Date Issued: **June 29, 1990**
Fact Sheet Number: **216**

DESCRIPTION OF CHEMICAL

Generic Name: Nicosulfuron [3-pyridinecarboxamide, 2-((((4,6-dimethoxypyrimidin-2-yl)aminocarbonyl)aminosulfonyl))-N,N-dimethyl]

Common and Code Name: Nicosulfuron, DPX-V9360

Trade and Other Names: Accent

EPA Shaughnessy Codes: 129008

Chemical Abstracts Service (CAS) Number: 111991-09-4

Year of Initial Registration: 1990

Pesticide Type: Herbicide

Chemical Family: Sulfonylurea

U.S. and Foreign Producers: E.I. du Pont de Nemours & Co., Inc.

USE PATTERNS AND FORMULATIONS

Application Sites: Field corn only. Accent is not to be used on popcorn, sweet corn, or corn grown for seed production.

Types and Methods of Application: Accent is to be applied to young, actively growing weeds with ground equipment.

Application Rates: Single application - Maximum single application is 1 1/3 ounce (oz) of Accent per acre (A) per any

crop year, (1 oz active ingredient (ai)/A) in a minimum of 10 gallons of water.

Split application - Application not to exceed a total of 1 1/3 oz Accent/A/crop year [recommended 2/3 oz of Accent each (0.5 oz/ai/A)].

Formulations: 75% water dispersible granule

SCIENCE FINDINGS

SUMMARY SCIENCE STATEMENT

Review of the product chemistry, environmental fate, toxicology and ecological effects data have been completed. The available data supports the conditional registration of Accent for the proposed food use. Data deficiencies exist in the ecological effects and environmental fate and ground water areas.

In the area of Environmental Fate and Ground Water, a new field dissipation and spray drift studies are required. However, the available environmental fate data supports the conditional registration of Accent.

With respect to ecological effects data, the Agency is requiring the company to submit a new seedling emergence study and additional information to upgrade the vegetative vigor study. However, the available ecological effects data supports the conditional registration of this chemical.

Available ecological effects data indicates that the hazard to avian, aquatic and mammalian species will be minimal.

The Agency does not believe that registration of this chemical will cause substantially greater adverse effect to the environment than other sulfonylurea products.

Chemical Characteristics of the Technical Material

N.R. - Not Required, N.A. - Not Applicable

	END USE PRODUCT (Accent)	TECHNICAL (Nicosulfuron)
Molecular Weight:	410.40	
Molecular Formula:	$C_{15}H_{18}N_6O_6S$	
Color:	light tan	white
Physical State:	solid, granular	solid
Odor:	none	paste-like

	END USE PRODUCT (Accent)	TECHNICAL (Nicosulfuron)
Melting Point:	N.R.	141-144 °C
Boiling Point:	N.A.	N.A.
Density:	0.53 g/ml	0.313 g/ml
Solubility:	N.R.	0.04* (pH 5.0 buffer); 1.2* (pH 7.0 buffer); and 3.9* (pH 9.0 buffer) *solubility limit, g/100 g buffer at 25°C
		*18 (acetone), *23 (acetonitrile), *1.7 (benzene), *64 (chloroform), *64 (N,N-dimethylformamide), *4.5 (ethanol), *3.8 (ethyl acetate), *<0.02 (n-hexane), *0.44 (methanol), *160 (methylene chloride), *1.2 (2-propanol), *26 (tetrahydrofuran), *0.37 (toluene), *0.20 (xylenes) *solubility limit, ppm x 10^3 at 28 $\pm$ 1 °C
Vapor Pressure:	N.R.	1.2×10^{-16} torr
Dissociation Constant:	N.R.	pK_a value = 4.3 (acid)
Octanol/Water Partition Coefficient:	N.R.	0.44 (pH 5) 0.017 (pH 7) 0.01 (pH 9)
pH:	3.9 (1% dispersion in water)	A slurry in HPLC water caused the pH of the water to decrease from 6.6 to 4.5.
Stability:	N.R.	The TGAI is solution stable in the presence of iron metal and ferrous (Fe^{+2}). The solid TGAI is stable under normal storage at 25 C and at 45 C for 3 weeks.

	END USE PRODUCT (Accent)	TECHNICAL (Nicosulfuron)
Oxidizing or Reducing Action:	Does not contain oxidizing or reducing agents.	
Flammability:	N.A.	
Explodability:	Not explosive	
Storage Stability:	Ten months result showed product stability at room temperature. Aging test continuing for two additional months.	
Viscosity:	N.A.	
Miscibility:	N.A.	
Corrosion Characteristics:	After being stored in the laboratory at room temperature for 10 month, no physical change was observed for either solid granules or container material of construction (high-density polyethylene).	
Dielectric Breakdown Voltage:	N.A.	

Toxicology Characteristics

Acute Testing

	TECHNICAL	FORMULATION
Acute Oral:	LD_{50} > 5000 mg/kg Toxicity Category - IV	LD_{50} > 5000 mg/kg Toxicity Category - IV
Acute Dermal:	LD_{50} > 2000 mg/kg Toxicity Category - III	LD_{50} > 2000 mg/kg Toxicity Category - III
Acute Inhalation:	LC_{50} > 5.9 mg/l Toxicity Category - III	LC_{50} > 5600 mg/m^3 Toxicity Category - IV
Primary Dermal Irritation:	Non-irritant Toxicity Category - IV	Mild Irritant Toxicity Category - IV
Primary Eye Irritation:	Moderate Irritant Toxicity Category - III	Moderate Irritant Toxicity Category - III

	TECHNICAL	FORMULATION
Dermal Sensitization:	Non-sensitizer	Non-sensitizer

Chronic Testing

Oncogenicity
In an 18-month oncogenicity study, mice administered dosages of 0, 3.3/4.4, 32.7/44.8, 327/438, and 993/1312 mg/kg/day resulted in a systemic NOEL of 993 and 1312 mg/kg/day (HDT) for male and female mice, respectively.

Chronic toxicity
In a 1-year feeding study, dogs were treated with accent at doses of 0, 62.5, 125, and 500 mg/kg/day. The systemic NOEL of 125 mg/kg/day for both sexes is based upon a decrease in body weight gains and a concomitant increase in relative liver and kidney weights in males.

Chronic toxicity/oncogenicity
A 2-year chronic toxicity/oncogenicity study with rats fed dosages of 0, 1.9/2.6, 58.1/77.1, 289/382, and 786/1098 mg/kg/day yielded a systemic NOEL of greater than or equal to 786 mg/kg/day in males and 1098 mg/kg/day in females, (HDT). The systemic Lowest-Observed-Effect Level (LOEL) is greater than 786 mg/kg/day and 1098 mg/kg/day for male and female rat, respectively.

Teratogenicity
A rat teratology study using doses of 0, 186, 930, 2325, and 5581 mg/kg/day had a developmental and maternal NOEL of greater than or equal to 5581 mg/kg/day (HDT). The maternal and developmental LOEL is greater than 5581 mg/kg/day. No treatment-related effects were noted on maternal or developmental toxicity up to and including 5581 mg/kg/day (HDT).

A rabbit teratology study using doses of 0, 93, 465, 930, and 1860 mg/kg/day of accent yielded a maternal NOEL of 93 mg/kg/day and LOEL of 465 mg/kg/day based upon maternal toxicity occurring at 465 mg/kg/day; an increase in clinical signs, gross pathological observations, abortions, postimplantation loss and a decrease in body weight gain during the dosing period. The developmental NOEL of 465 mg/kg/day and LOEL of 930 mg/kg/day is based upon developmental toxicity occurring at 930 mg/kg/day; reduced mean fetal body weight and the apparent increase in postimplantation loss at 465 mg/kg/day and above.

Reproduction
In a multigeneration reproduction study, rats were fed doses of 0, 12.5, 287, and 1269 mg/kg/day. The NOEL for systemic toxicity is 287 mg/kg/day with a LOEL of 1269 mg/kg/day, based on F_1 (first mating) females with a lower body weight gain during the final week of gestation and a similar pattern in the F_0 females during the same

gestational period. The Reproductive NOEL is 287 mg/kg/day with a LOEL of 1269 mg/kg/day based on minimal reduction in litter size at birth and in pup weights at postpartum day 14 through 21 in the F_{2a} high dose group.

Special Testing

Metabolism
The requirement for a metabolism study in rats has been satisfied. Five groups of rats, 5 males and 5 females, were dosed in various sequences with either 10 mg/kg or 1000 mg/kg of [pyridinyl-14C]-DPX-V9360 or [pyrimidinyl-14C]DPX-V9360 either orally or intravenously. Both males and females excreted essentially all of the radionuclide in the feces and urine. Elimination of 14C-CO_2 was not observed. No organ or tissue showed total 14C-radioactivity >0.01 of the administered dose. The major radioactivity was recovered as the parent which ranged from 85 to 97%. Two metabolites, pyridine sulfonamide and 5-hydroxy pyrimidine amine, were identified. The presence of pyridine acid sulfonamide was also suggested, but not positively identified. Several undefined metabolites makeup <10% TRR. Based on the metabolites identified, the major pathway in the rat is cleavage of the parent DPX-V9360, to yield pyridine sulfonamide and pyrimidine amine; 5-OH pyrimidine amine could be formed either before or after the cleavage.

Mutagenicity Testing

No mutagenic activity was observed when tested in four strains (TA97A, TA98, TA100, and TA1535) of Salmonella typhimurium. In vitro chromosomal aberration test in cultured human lymphocytes indicated negative responses at the concentrations from 40 to 470 ug/ml. Nicosulfuron assayed with or without metabolic activation in vitro in Chinese Hamster Ovary (CHO) cells was nonmutagenic at the concentrations from 4 to 465 ug/ml and a micronucleus assay in mouse bone marrow cells was negative at dose levels from 500 to 5000 mg/kg. An unscheduled DNA synthesis study in rat hepatocytes did not cause any DNA damage in rat hepatocytes at the concentrations from 0.04 to 470 ug/ml.

Physiological and Biochemical Characteristics

Mechanism of Pesticidal Action:
Biodegradation is an important degradation mechanism of nicosulfuron.

Foliar Absorption:
Foliar absorption is the primary means of nicosulfuron uptake by plants.

Environmental Characteristics

Hydrolysis - Nicosulfuron is stable in aqueous solutions at neutral and alkaline pHs. Solubility increases with increasing pH. The main

hydrolytic mechanism involves cleavage of the sulfonylurea bridge, but a minor mechanism involving $-SO_2-$ elimination followed by rebridging also occurs at acidic pHs. The main hydrolytic degradates are pyrimidine amine and pyridine sulfonamide.

Photodegradation in water and on soil - Photodegradation is not a significant degradation mechanism for nicosulfuron.

Aerobic Soil Metabolism - Biodegradation is an important degradation mechanism for nicosulfuron. The half-life of nicosulfuron in a silt clay soil is 26 days. The main degradates are pyridine sulfonamide and pyrimidine amine.

Anaerobic Soil/aquatic Metabolism - Biodegradation is an important degradation mechanism for Nicosulfuron. However, anaerobic conditions slow down the degradation process. The half-life of nicosulfuron in silt clay soil/water is 63 days. The main degradates are pyridine sulfonamide and pyrimidine amine.

Mobility in soil - Nicosulfuron is very mobile in sandy loam and silt loam soils. The pyridine sulfonamide degradate is more mobile than the parent. The pyrimidine amine degradate is the least mobile.

Volatility from soil - Nicosulfuron is not likely to volatilize from soil.

Terrestrial field dissipation - This study was determined to be supplemental and cannot be used to define a depth of leaching or to use the reported half-lives to estimate the persistence of nicosulfuron under field conditions.

Accumulation in Confined Rotational Crops and in Fish - Degradates containing the pyridine ring are more readily uptaken by the plants. The minimum rotational crop interval is 10-months. Nicosulfuron has a low tendency to accumulate in fish.

The Environmental Fate and Ground Water Branch (EFGWB) has determined that the following data requirements have been satisfied: hydrolysis, photodegradation on soil and in water, aerobic and anaerobic soil metabolism, anaerobic aquatic metabolism, mobility in soil, and accumulation in confined rotational crops. The volatility from soil studies and the bioaccumulation in fish study have been waived. The terrestrial field dissipation study was considered supplemental and a new study must be submitted as a condition for registration.

Spray drift studies are being requested as a part of the conditional registration. Submission of these data will address concerns about the potential to harm nontarget plants during application and ways to prevent adverse effects.

Ecological Characteristics

		Classification
Avian acute toxicity:		
Bobwhite Quail	LD_{50} > 2000 mg/kg	Practically Non-toxic
Avian dietary toxicity:		
Bobwhite Quail	LC_{50} > 5000 mg/kg	Slightly Toxic
Mallard Duck	LC_{50} > 5000 mg/kg	Slightly Toxic
Freshwater fish acute toxicity:		
Bluegill Sunfish	LC_{50} > 1000 ppm	Practically Non-toxic
Rainbow Trout	LC_{50} > 1000 ppm	Practically Non-toxic
Freshwater invertebrate toxicity:		
Daphnia magna	LC_{50} > 1000 ppm	Practically Non-toxic
Acute Contact toxicity:		
Honey bee	LD_{50} > 20 ug/bee	Practically Non-toxic

Available data indicates that the hazard to avian, aquatic and mammalian species will be minimal. The terrestrial nontarget plant data does not fulfill data requirements. Nicosulfuron is practically non-toxic to freshwater fish and invertebrates. This chemical is slightly toxic to birds on an acute and dietary basis. In addition nicosulfuron is practically non-toxic to honey bees.

The Agency does not believe that conditional registration of this chemical will not cause substantial greater adverse effects to the environment than other sulfonylurea products.

Potential problems related to Endangered Species: It is not expected that nicosulfuron will pose any hazards to endangered species.

TOLERANCE ASSESSMENT

Tolerances have been established for residues of the herbicide in or on the raw agricultural commodity corn, in the form of grain, forage, silage, and fodder (40 CFR 180.).

corn, grain	0.1 ppm
corn, fodder	0.1 ppm
corn, silage	0.1 ppm
corn, forage	0.1 ppm

There are no tolerances established for residues of nicosulfuron in/on corn in Canada, Mexico or by Codex.

Summary of Other Permanent Tolerances for Nicosulfuron

The only permanent tolerances established for nicosulfuron at this time are the above corn raw agricultural commodities (RACs). No other permanent tolerances have been established for nicosulfuron.

Summary of Regulatory Positions

As a condition of registration, the registrant must submit a new terrestrial field dissipation study, additional information on the photodegradation in water study, spray drift studies, a new seedling emergence study and additional information to upgrade the vegetative vigor study.

Required Unique Labeling

PRECAUTIONARY STATEMENTS
"Do not apply where/when conditions could favor runoff"

"Do not apply if rainfall or storm is expected within 24 hours"

USE DIRECTIONS
"The minimum rotational crop interval is 10-months, except for alfalfa which is 12-months."

RESTRICTIONS
"The minimum time interval for sorghum, cotton, and all other rotational crops is 10-months on soils with pH less than or equal to 6.5 or 18 months for all soils with pH greater than 6.5."

"Do not apply to popcorn, sweet corn or corn grown for seed production."

"Single or split applications of Accent must not exceed a total of 1 1/3 oz/A in any one crop year."

"Do not graze or feed forage or grain from the treated areas to livestock within 30 days after application of Accent."

Summary of Major Data Gaps

Environmental Fate
164-1 Terrestrial Field Dissipation
201-1 Droplet size spectrum
202-1 Drift field evaluation

Ecological Effects
122-1 Seedling Emergence
122-1 Vegetative Vigor

B170
9

CONTACT PERSON AT EPA

Robert J. Taylor
Product Manager (25)
Fungicide-Herbicide Branch
Registration Division (H7505C)
Office of Pesticide Programs
Environmental Protection Agency
401 M Street, S. W.
Washington, D. C. 20460

Office location and telephone number:

Room 245, Crystal Mall #2
1921 Jefferson Davis Highway
Arlington, VA 22202
(703) 557-1800

DISCLAIMER: The information in this Pesticide Fact Sheet is a summary only and is not to be used to satisfy data requirements for pesticide registration and reregistration. The complete Registration Standard for the pesticide may be obtained from the contact person listed above.